REMARKS

This communication is responsive to the Official Action mailed November 26, 2003. A one-month extension of the time to reply, up to and including March 26, 2004, is filed concurrently herewith.

Applicants have amended the specification to correct typographical errors and improve its form. Applicants respectfully submit that the amendments to the specification do not constitute the addition of new matter. In accordance with 37 C.F.R. § 1.125, applicants are including herewith a marked-up version showing all the changes ("Marked-Up Substitute Specification") and a clean version without markings ("Clean Substitute Specification") of the original specification. The Clean Substitute Specification has also been revised to include paragraph numbering as indicated. Applicants respectfully request that the Examiner replace the specification of record with the Clean Substitute Specification.

Claims 2 and 12 are canceled as a result of the present amendment. Claims 1 and 11 have been recast to include the subject matter previously recited in claims 2 and 12, respectively.

In particular, claim 1 now recites "for each of said selected devices, said register storing a record of said identification number allocated to said selected device and maintaining said record regardless of whether said selected device remains connected to said digital interface." Claim 11 has been amended to now recite "said registering step including allocating an identification number to each of said selected devices and, for each of said selected devices, storing a record of said identification number for said selected device regardless of whether said selected device has been connected to the digital interface." Applicants respectfully submit that

these amendments to claims 1 and 11 do not constitute the addition of new matter as support for these amendments may be found, for example, by reference to Figs. 4-6 and their accompanying descriptions.

The remaining claims presently pending in the application, namely claims 3-10 and 13-20, have been amended to improve their form in view of the amendments to claim 1 and claim 11. Applicants respectfully submit that the amendments to claims 3-10 and 13-20 do not constitute the addition of new matter.

In the Official Action the Examiner rejected claims 1, 5, 10, 11, 15 and 20 under 35 U.S.C. § 102(b) as being anticipated by European Patent Application No. EP 0,853,402A to *Yoshino, et al.* ("*Yoshino*"). The Examiner rejected claims 2-4, 6-9, 12-14 and 16-19 under 35 U.S.C. § 103(a) as being unpatentable over *Yoshino* in view of U.S. Patent No. 6,333,739 to *Koyama, et al.* ("*Koyama*").

In rejecting claims 2 and 12, the Examiner admits that "*Yoshino* fails to discloses [sic] maintaining a registration, whether the selected digital signal processing devices has [sic] been connected to the digital interface or not." (Official Action at 4.) The Examiner, however, asserts that:

> Koyama, though disclosing maintaining a registration (col. 5, lines 34-38, discussing correlation of node ID and unique ID of connected devices and storage of node ID and unique ID data pairs in memory), whether the selected devices have been connected to the digital interface or not (see col. 6, lines 34-45 discussing comparison of unique ID values with node ID values following a bus reset; see col. 7, lines 8-11 discussing reconnection of a previously connected device) for the advantage of allowing a device connected to a network to be temporarily removed from the network without necessitating reconfiguration of the network upon reconnection of said device. [Emphasis added.]

Thus, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify *Yoshino* to include maintaining a registration, regardless of the connection state of the selected digital signal processing devices as taught by *Koyama*.

The Examiner also asserts that *Koyama* discloses "maintaining a registration . . . whether the selected devices have been connected to the digital interface or not (*see* col. 6, lns. 34-45, discussing comparison of unique ID values with node ID values following a bus reset; col. 7, lns. 8-11, discussing reconnection of a previously connected device)" (*Id.* at 5.)

In fact, *Koyama* explicitly teaches:

> For example, if the DVC 102 is deleted from the communication system, a bus resetting occurs in the communication system shown in FIG. 1, and the re-recognition of the system configuration is started according to the IEEE 1394 standard, whereby each device is given a new node ID which is different from that at the start of the editing operation. [Emphasis added.]

(*Koyama*, col. 6, lns. 34-35.)

As the cited text makes clear, each time a device is deleted from the communication system, a bus resetting occurs and re-recognition of the system configuration occurs "whereby each device is given a new node ID which is different from that at the start of the editing operation." (*Id.*) Thus, to put it simply, the deletion of a device causes the bus to re-set and each device to be given a new node ID. This is completely opposite to that which is asserted by the Examiner. Further in this regard, *Koyama* discloses that the newly acquired unique ID of each device is thereafter recorded in the table file 601. (*Id.*, col. 6, lns. 46-49.)

In addition, *Koyama* also discloses "in case of the addition of a new device (DVC 801) to the communication system,

a bus resetting occurs in the communication system . . . and the re-recognition of the system configuration is started according to the IEEE 1394 standard." (*Id.*, lns. 62-67.) *Koyama* continues by stating that after the bus resetting "each device is given a new node ID which is different from that at the start of the editing operation." (*Id.*, col. 6, ln. 67 to col. 7, ln. 2.) Thus, at column 7, lines 8-11, *Koyama* is not "discussing reconnection of a previously connected device," as is erroneously asserted by the Examiner, but instead is discussing the addition of a new device to the communication system. Even assuming *arguendo* that the Examiner's assertion that *Koyama* discussed reconnection of a previously connected device was true, this paragraph explicitly states that the PC 104 "changes the node ID recorded in the table file 601 to the reset node ID." Thus, this portion of *Koyama* (as well as col. 6, lns. 46-49) completely refutes the Examiner's assertion that *Koyama* teaches or suggests the advantage of allowing a device to be temporarily removed or added to a network without necessitating reconfiguration of the network upon reconnection of the device. In fact, *Koyama* makes it abundantly clear that a bus resetting and a re-recognition of the system configuration occurs each and every time a new device is added to the communication system, or a device is deleted therefrom. As such, applicants find it astounding that the Examiner can rely on *Koyama* to overcome the deficiency in *Yoshino* when, indeed, *Koyama*'s teachings are completely opposite to that which is recited in the claims.

In particular, claim 1 recites "for each of said selected devices, said register storing a record of said identification number allocated to said selected device and maintaining said record regardless of whether said selected device remains connected to said digital interface." Claim 11 recites "said registering step including allocating an

identification number to each of said selected devices and, for each of said selected devices, storing a record of said identification number for said selected device regardless of whether said selected device has been connected to the digital interface." As such, neither *Yoshino* nor *Koyama* disclose, teach or suggest this portion of claims 1 and 11. For at least this reason, *Yoshino* and *Koyama* cannot be combined in any manner to obviate claims 1 and 11.

As all of the remaining claims pending in the application, namely, claims 3-10 and 13-20, depend from either claim 1 or 11, applicants submit that these claims are also not obvious over *Yoshino* in view of *Koyama* for at least the reasons discussed above.

As it is believed that all of the rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited. If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicants' attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

Dated: March 25, 2004

Respectfully submitted,
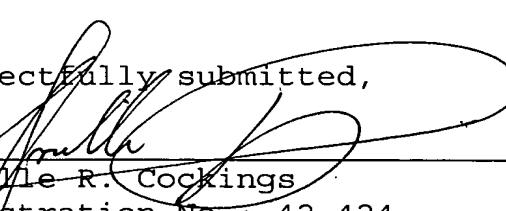
By _____
Orville R. Cockings
Registration No.: 42,424
LERNER, DAVID, LITTENBERG,
  KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorney for Applicant

484627_1.DOC

13

MARKED-UP COPY OF

SUBSTITUTE SPECIFICATION

AND ABSTRACT

RECEIVING SYSTEM FOR DIGITAL BROADCASTING AND
RECEIVING APPARATUS FOR DIGITAL BROADCASTING

BACKGROUND OF THE INVENTION

~~Field of the Invention~~

[0001]   The invention relates to a receiving system ~~for a digital broadcasting~~ for receiving a digital broadcast signal in which, for example, video data and audio data are broadcasted by a transport stream of an MPEG (Moving Picture Experts Group) 2 system and transmitting the transport stream to digital signal processing equipment through an interface of IEEE (Institute of Electrical Electronic Engineers) 1394. The invention also relates to a receiving apparatus for a digital broadcasting which is used for such a system.

~~Description of the Related Art~~

[0002]   In recent years, ~~IEEE1394~~IEEE 1394 has ~~been started to spread~~gained popularity as an interface to transfer video data and audio data between digital video equipment and digital audio equipment at a high speed. ~~In IEEE1394~~IEEE 1394~~,~~ supports an isochronous transfer mode and an asynchronous transfer mode ~~are supported~~. A delay time of a data transfer is guaranteed in the isochronous transfer mode. The isochronous transfer mode is suitable to transfer a time-sequential data stream such as video data or audio data at a high speed. The asynchronous transfer mode is suitable to transfer ordinary data such as various commands or the like.

[0003]   In recent years, ~~a~~ digital satellite broadcasting has ~~been started to spread~~also gained in popularity. In the digital satellite broadcasting, a digital video signal and an audio signal are compressed by ~~the~~ an MPEG2 system, multiplexed ~~by~~into a packet stream, and transmitted. ~~When a~~A digital satellite ~~broadcasting~~broadcast signal is typically received~~,~~ by an IRD (Integrated Receiver Decoder) which is

connected to a television receiver. A ~~signal of a~~ desired program signal is selected by the IRD and a video signal and an audio signal are decoded. An output of the IRD ~~is~~ may then be supplied to the TV receiver.

[0004] A method of providing ~~the interface of~~ an ~~IEEE1394~~ IEEE 1394 interface on an ~~for the~~ IRD to receive such a digital satellite ~~broadcasting~~ broadcast signal has been proposed. When ~~the interface of~~ an ~~IEEE1394~~ IEEE 1394 interface is provided for ~~the~~ an IRD, the IRD is connected to a digital video recording and reproducing apparatus or an MD recording and reproducing apparatus through the ~~interface of~~ ~~IEEE1394~~ IEEE 1394 interface and a receiving system ~~for~~ so that the digital satellite ~~broadcasting~~ broadcast signal can be constructed.

[0005] In accordance with the ~~IEEE1394~~ IEEE 1394 standard, when data is transferred, an ID number of a node is allocated and a partner is designated by the ID number of the node. ~~There are "0" to "63" as~~ The node ID numbers which can be allocated to a bus of ~~IEEE1394~~ IEEE 1394 are "0" to "63." The last node number among them is used for broadcasting. Now, assuming that ~~the~~ broadcast is not used, ~~therefore,~~ then up to 63 equipment units can be connected to one bus.

[0006] In case of constructing ~~the~~ a receiving system for ~~the~~ digital satellite broadcasting by using ~~the~~ an IRD having ~~the interface of~~ an ~~IEEE1394~~ IEEE 1394 interface as mentioned above, a method whereby the ID numbers of the nodes are allocated ~~to~~ for up to 63 equipment units in accordance with the ~~IEEE1394~~ IEEE 1394 standard to thereby enable data to be transmitted ~~among the up~~ to ~~63~~ such equipment is considered.

[0007] Generally, in the receiving system for the digital satellite broadcasting, however, it is hard to consider a situation ~~that~~ where 63 equipment units are connected to the ~~bus of IEEE1394~~ IEEE 1394 bus and used~~, and~~. Thus, it is ~~considered~~ generally accepted that the number of equipment

which ~~are~~that will be connected to the ~~bus of IEEE1394~~IEEE 1394 bus is equal to or less than 5. ~~Therefore~~In addition, if ~~a construction such that~~ up to 63 equipment units can be connected in accordance with the ~~IEEE1394~~IEEE 1394 standard ~~is designed~~, ~~a use~~ efficiency deteriorates. For example, when ~~the~~ recording is ~~set~~desired, equipment to record is selected. In this instance, if the number of equipment ~~which can~~that is be connected is larger than the number of equipment units actually used, a number of equipment units are arranged on a selection display picture plane and it is difficult to ~~designate~~ select the desired equipment.

[0008] A GUI picture plane showing operations and control states of a plurality of equipment units connected to a bus of ~~IEEE1394~~IEEE 1394 is disclosed in U.S.~~P. Nos.~~ Patents 5,793,366 and 5,883,621. By observing the GUI picture plane, the user can visually recognize which equipment is ~~at~~ presently connected to the ~~bus of IEEE1394~~IEEE 1394 bus, from which equipment and to which equipment data is transmitted, and further, to which equipment the recording is performed. According to those ~~inventions~~patents, however, the IRD can recognize only the equipment connected to the ~~bus of IEEE1394~~IEEE 1394 bus and, ~~if they are~~ once such equipment is disconnected, the equipment ~~cannot~~ can no longer be recognized. Therefore, each time ~~the~~ equipment is connected to the ~~bus of IEEE1394~~IEEE 1394 bus, ~~which~~such equipment ~~is connected~~has to be set and recognized on the IEEE 1394 bus.

~~OBJECTS AND~~ SUMMARY OF THE INVENTION

[0009] It is, therefore, an object of the invention to provide a receiving apparatus for a digital broadcasting, in which in the case where a plurality of equipment units are connected to the interface of ~~IEEE1394~~IEEE 1394, the operability is improved and the equipment connected to the interface of ~~IEEE1394~~IEEE 1394 are disconnected, and even if

they are connected again, the equipment can be recognized without setting the equipment which is connected.

[0010]   According to the invention, there is provided a receiving apparatus for a digital broadcasting for receiving a digital broadcasting which is transmitted by a transport stream in which video data and audio data have been compressed and multiplexed, comprising: a decoder for decoding the transport stream; a digital interface for transmitting and receiving the transport stream to/from digital signal processing equipment; and a register for selecting a predetermined number of equipment units among a plurality of digital signal processing equipment connected to the digital interface and allocating ID numbers to the selected equipment.

[0011]   Although up to 63 equipment units can be connected to the interface of ~~IEEE1394~~IEEE 1394, for example, five equipment units are selected among them and node ID numbers are allocated to the selected five equipment units and registered.   Thus, the equipment can be easily selected.

[0012]   The above and other objects and features of the present invention will become apparent from the following detailed description and the appended claims with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]   Fig. 1 is a schematic diagram of an example of a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0014]   Fig. 2 is a rear view showing a rear panel of an IRD in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0015]   Fig. 3 is a block diagram ~~showing a construction~~ of the IRD in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0016]   Fig. 4 is a block diagram for use in ~~explanation~~ ~~of~~explaining the receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0017]   Fig. 5 is a schematic diagram ~~for use in explanation~~ of a control panel display ~~in~~ on the IRD in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0018]   Figs. 6A and 6B are schematic diagrams ~~for use in explanation~~ of a setting display ~~in~~ on the IRD in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0019]   Figs. 7A to 7C are schematic diagrams ~~for use in explanation~~ of a setting display ~~in~~ on the IRD in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0020]   Figs. 8A and 8B are flowcharts for ~~use in explanation of a~~ registration of equipment in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied;

[0021]   Fig. 9 is a flowchart for ~~use in explanation of a~~ registration of equipment in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied; and

[0022]   Fig. 10 is a schematic ~~diagram for use in~~ ~~explanation of~~illustrating broadcasting in ~~the~~ a receiving system for ~~a~~ digital satellite broadcasting to which the invention is applied.

DETAILED DESCRIPTION ~~OF THE PREFERRED EMBODIMENT~~

[0023]   An embodiment of the invention will now be described hereinbelow with reference to the drawings.   In Fig. 1, reference numeral 1 denotes an integrated receiver decoder (IRD).   The IRD 1 decodes a ~~reception~~ signal received from ~~of~~ a digital satellite broadcasting system and forms a video signal and an audio signal ~~of~~, for example, for the NTSC

system. An antenna terminal of the IRD 1 is connected through a cable 2 to a low-noise converter 4 attached to a parabolic antenna 3. A radio wave from a satellite is transmitted ~~by~~within, for example, a frequency band of 12 GHz. The radio wave from the satellite is received by the parabolic antenna 3 and converted into a signal ~~of~~operating in, for example, a frequency band of 1 GHz by the low-noise converter 4 attached to the parabolic antenna 3.

[0024] An output of the low-noise converter 4 is supplied to the antenna terminal of the IRD 1 through the cable 2. In the IRD 1, a signal of a desired carrier wave is selected from the reception signal and a transport stream of MPEG2 is demodulated. A video packet and an audio packet of a desired program are extracted from the transport stream and decoded. For example, the video signal and audio signal of the NTSC system are decoded.

[0025] The video signal and audio signal from the IRD 1 are supplied to a television receiver 6 through a cable 5. A reception picture plane of a desired satellite broadcasting program is displayed and its audio sound is generated by the TV receiver 6.

[0026] An IC card 7 is inserted into the IRD 1. Reception information is stored into the IC card 7. The IRD 1 is connected to a telephone line distributor 8 through a cable 9 and charging information is sent to the IRD 1 through a telephone line.

[0027] The IRD 1 is ~~operated~~ operable by a remote controller 11. When a video mouse 10 is attached, the user can set a reservation program while observing the picture plane which is displayed to the TV receiver 6.

[0028] As shown in Fig. 2, a rear panel of the IRD 1 is equipped with: terminals 21A and 21B of ~~IEEE1394~~IEEE 1394; an optical digital audio output terminal 22; an MD mouse terminal 23; analog audio output terminals 24A to 24D; video output

6

terminals 25A and 25B; S video output terminals 26A and 26B; and a data output high-speed parallel terminal 27.

[0029]   The terminals 21A and 21B of ~~IEEE1394~~IEEE 1394 are provided to perform a data transfer by using the ~~interface of IEEE1394~~IEEE 1394 interface.   An isochronous transfer mode and an asynchronous transfer mode are supported ~~in~~by the ~~IEEE1394~~IEEE 1394 standard.   A delay time of a data transfer is guaranteed in the isochronous transfer mode.   In the isochronous transfer mode, a time-sequential data stream such as video data or audio data can be transferred at a high speed.   In the asynchronous transfer mode, data such as various commands or the like is transferred.

[0030]   A digital audio signal is outputted from the optical digital audio output terminal 22 by using an optical cable of IEC958.   The optical digital audio output terminal 22 is used to connect digital audio equipment or the like having the optical cable of IEC958.   The analog audio output terminals 24A to 24D are used to output an analog audio signal.   The video output terminals 25A and 25B and S video output terminals 26A and 26B are used to output a demodulated video signal.

[0031]   Fig. 3 shows a construction of the IRD 1.   As shown in Fig. 1, a radio wave of a digital satellite broadcasting ~~sent by a radio wave of~~transmitted in a frequency band of, for instance, 12 GHz through a satellite is received by the parabolic antenna 3 and converted into a signal ~~of~~in a frequency band of 1 GHz by the low-noise converter 4 attached to the parabolic antenna 3.   An output of the low-noise converter 4 is supplied to an antenna terminal 31 of the IRD 1 through the cable 2.   A signal from the antenna terminal 31 is supplied to a tuner circuit 32.

[0032]   The tuner circuit 32 comprises: a frequency selecting circuit to select a signal of a predetermined carrier frequency from the reception signal; a demodulating

circuit for performing a QPSK (Quadrature Phase Shift Keying) demodulating process; and an error correction processing circuit. In the tuner circuit 32, a signal of a desired carrier frequency is selected from the reception signal on the basis of a setting signal from a control CPU (Central Processing Unit) 33. The reception signal is QPSK (Quadrature Phase Shift Keying) demodulated and, further, subjected to an error correcting process.

[0033] An output of the tuner circuit 32 is supplied to a descrambler 34. Received ECM (Entitlement Control Message) data and EMM (Entitlement Management Message) data are inputted to a descrambler 34. Key data for descrambling stored in the IC card 7 inserted in an IC card slot 36 is also supplied. The descrambler 34 descrambles an MPEG transport stream by using the received ECM data and EMM data and the key data of the IC card 7. The descrambled transport stream of MPEG2 is sent to a demultiplexer 37.

[0034] The demultiplexer 37 separates a desired packet from the stream from the descrambler 34 on the basis of a command from the CPU 33. A packet identifier (PID) is provided in a header portion of the transmitted packet. The demultiplexer 37 extracts a video packet and an audio packet of a desired program on the basis of the PID. The video packet of the desired program is sent to an MPEG2 video decoder 38. The audio packet is sent to an MPEG audio decoder 39.

[0035] The MPEG2 video decoder 38 receives the packet of the video signal from the demultiplexer 37 and performs a decoding process of the MPEG2 system, thereby forming video data. The video data is supplied to an NTSC converting circuit 40. In the NTSC converting circuit 40, the video data decoded by the MPEG2 video decoder 38 is converted into a video signal of compatible with the NTSC system.

[0036] A display control circuit 51 and a copy inhibition control circuit 52 are provided for the NTSC converting

circuit 40. The display control circuit 51 allows various display picture planes to be generated on a screen. The copy inhibition control circuit 52 generates a copy inhibition control signal as necessary in order to protect the copyright of a video image.

[0037] An output of the NTSC converting circuit 40 is supplied to the analog video output terminals 25 and S video output terminals 26. An analog video signal of the NTSC system is outputted from the analog video output terminals 25 and an S video signal is outputted from the S video output terminals 26.

[0038] The MPEG audio decoder 39 receives the audio packet from the demultiplexer 37 and performs an audio decoding process of the MPEG system, thereby forming audio data before data compression. The decoded audio data is outputted from the optical digital audio output terminal 22 through an IEC958 interface circuit 55, converted into an analog audio signal by a D/A converter 53, and thereafter, supplied to the analog audio output terminals 24.

[0039] An input to the IRD 1 is supplied from an input unit 46. The remote controller 11, a video mouse, or the MD mouse 10 is prepared as an input by input unit 46. A modem 45 is provided and charging or billing information is sent by the modem 45 via a telephone line.

[0040] A carrier frequency of the reception signal is set on the basis of a channel setting signal inputted by the viewer. When a desired program is set, a receiving frequency of the tuner circuit 32 is set to a predetermined carrier frequency by referring to an NIT (Network Information Table). A packet of the PID in a PMT (Program Map Table) as information regarding a desired channel is extracted with reference to a PAT (Program Association Table) as information regarding a channel at the carrier frequency. The video

image, audio sound, and PID of a packet of additional data of a desired channel are obtained by referring to the PMT.

[0041]   An interface 44 of ~~IEEE1394~~IEEE 1394 is provided for the IRD 1.   A transport stream or PCM audio data can be inputted and outputted between the demultiplexer 37 and interface 44 of ~~IEEE1394~~IEEE 1394.

[0042]   An interface 56 for high-speed parallel data is further provided for the IRD 1.   The transport stream or PCM audio data can be inputted and outputted through the high-speed parallel data interface 56.

[0043]   As mentioned above, the interface 44 of ~~IEEE1394~~IEEE 1394 is provided for the IRD 1 to which the invention is applied.   By using the interface 44 of ~~IEEE1394~~IEEE 1394, as shown in Fig. 4, other digital equipment 15A, 15B, 15C, ... which can perform the digital recording, for example, a digital video recording and reproducing apparatus, an MD recording and reproducing apparatus, and the like are connected to the IRD 1.

[0044]   In ~~IEEE1394~~IEEE 1394 standard, ~~there are~~ "0" to "63" are available as node ID numbers. The last node number "63" among them is used as a broadcasting channel. The ID number of the node is automatically allocated when the equipment is connected to the bus of the ~~IEEE1394~~IEEE 1394 interface. In this instance, up to five equipment units among the equipment connected to the bus are registered and the ID numbers of the nodes are allocated to the registered equipment and stored into a nonvolatile memory 60 in correspondence to the registered equipment. The number of corresponding equipment units which are connected is limited to 5 or less.

[0045]   The registered equipment can be changed by shifting the picture plane from a display of a control panel as shown in Fig. 5 to a picture plane for changing the setting by pressing a "set" button 66. In the display of the control panel, there are provided: an equipment selection display 61;

a "function" button display 62; a state display 63; a "power" button 64; a "record" button 65; a "set" button 66; an ~~IEEE1394~~IEEE 1394 input switching button 67 (~~IEEE1394~~IEEE 1394 is displayed as i.LINK); and a "smart file" executing button 68. Names of the five registered equipment units of ~~IEEE1394~~IEEE 1394 are shown in the equipment selection display 61. Desired equipment which the user wants to connect to the bus of ~~IEEE1394~~IEEE 1394 can be selected from the five equipment units by the equipment selection display 61.

[0046] When the "set" button 66 is pressed from the display of the control panel, a setting picture plane as shown in Figs. 6A and 6B is displayed.

[0047] As shown in Fig. 6A, a registered equipment display 71, a connected equipment display 72, a "decide" button 73, and a "return" button 74 are displayed on a set changing picture plane.

[0048] Up to five equipment units to which the ID numbers were allocated as nodes of ~~IEEE1394~~IEEE 1394 are displayed in the registered equipment display 71. The equipment displayed more brightly among them denotes the equipment ~~connected~~ physically connected to the bus. When the registered equipment is disconnected from the bus, the display of the registration name becomes dimmer. When the registered equipment is connected again to the bus, the display of the registration name becomes bright.

[0049] As for the five equipment units which are connected through the bus of the ~~IEEE1394~~IEEE 1394 interface, five equipment units ~~which~~ that were first connected ~~early~~ are first automatically registered. If five equipment units have already been registered, the sixth and subsequent equipment are not registered.

[0050] In case of changing or removing the equipment which is connected through the bus of ~~IEEE1394~~IEEE 1394, a check mark is added to a check box 72A in the connected equipment

display 72. The equipment to which the check mark has been added becomes a target of registration. The equipment to which the check mark is not added is removed from a target of registration. In this instance, the equipment in which the reservation recording has been set and the connected equipment cannot be changed. This is because if the equipment in which the reservation recording has been set and the connected equipment are removed, an inconvenience such that the reservation recording cannot be performed or data cannot be transmitted occurs.

[0051] As shown in Fig. 6B, for instance, a reservation mark 75 like a clock mark is displayed on the equipment in which the reservation recording has been set. In the equipment in which the reservation mark 75 has been displayed, the check mark of the check box 72A cannot be removed.

[0052] Figs. 7A to 7C show processes in case of changing the registered equipment and show a case where, for example, the equipment of D-VHS2 is changed to the equipment of MD3. As shown in Fig. 7A, first, a cursor is moved to a position of the equipment of D-VHS2. Subsequently, the "decide" button 73 is pressed. When the "decide" button 73 is pressed at this position, the check mark of D-VHS2 is removed as shown in Fig. 7B. After that, the cursor is moved to a position of equipment which the user wants to newly register. The "decide" button 73 is pressed at this position. Thus, the check mark is added to the position of MD3 as shown in Fig. 7C. After the check mark is changed and the setting picture plane is finished by pressing the "return" button 74 in this manner, the equipment to which the check mark has newly been added is registered.

[0053] The expression of "VHS", "MD", or the like shows the kind of equipment. When the same kind of equipment is registered, the equipment is identified by the number written after such an expression. When the registration of the

equipment is changed, the number subsequent to the expression showing the kind of equipment is changed in accordance with the change.

[0054]   Figs. 8A and 8B are flowcharts for performing the processes as mentioned above and show an automatic registering process of equipment. As shown in Fig. 8A, when the equipment is connected, whether the number of connected equipment is equal to or larger than 64 or not is discriminated (step S1). If the number of connected equipment is equal to or larger than 64, it is determined that there is a bus error (step S2). The processing routine is finished. If the number of equipment connected to the bus is smaller than 64 in step S1, whether the number of registered equipment is equal to or less than 5 or not is discriminated (step 3). If the number of registered equipment is larger than 5, the ID numbers of the nodes and the equipment names are not registered (step S4). The processing routine is finished.

[0055]   If the number of equipment connected to the bus is equal to or less than 5 in step S3, the unique ID numbers of the nodes of the equipment connected to the bus are discriminated (step S5). The registration contents stored in the nonvolatile memory 60 are discriminated and whether there is the equipment having the ID number among the registered equipment or not is discriminated (step S6).

[0056]   If the equipment having the same ID number as that of the connected equipment cannot be found out among the registered equipment, the ID number and the equipment name are newly registered (step S7).   This equipment name is more brightly displayed (step S8).

[0057]   If the equipment having the same ID number as that of the connected equipment exists among the registered equipment, the name of the registered equipment is allocated (step S9).   This equipment name is more brightly displayed (step S8).

[0058]   As shown in Fig. 8B, when the connected equipment is disconnected from the bus of ~~IEEE1394~~IEEE 1394 and enters a non-connecting state, the equipment name ~~is darkly~~ displayed is dimmed (step S10).

[0059]   Fig. 9 is a flowchart showing processes when the registered equipment is changed.   In Fig. 9, when the equipment is selected and the "decide" button 73 is pressed (step S21), whether the check mark has been previously added ~~so far~~ or not is discriminated (step S22).

[0060]   If the check mark ~~is~~ was not previously added ~~so far~~, whether the check marks have been added to five equipment or not is discriminated (step S23).   If the check marks are not added to five equipment, the check marks are added to those equipment (step S24).   A check is made to see if the setting picture plane is finished (step S25).   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0061]   If it is decided in step S23 that the check marks have been added to the five equipment, the check marks are not changed but step S25 follows and whether the setting picture plane is finished or not is discriminated.   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0062]   If it is decided in step S22 that the check marks have been previously added ~~so far~~, whether the program reservation has been made to the equipment or not is discriminated (step S26).   Since the registration is not reset in the equipment in which the program has been reserved, if it is the reserved equipment, the check marks are not changed but step S25 follows.   Whether the setting picture plane is finished or not is discriminated.   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0063]   If it is decided in step S26 that the equipment is not the reserved equipment, whether the equipment has been connected or not is discriminated (step S27).   Since the registration cannot be reset in the connected equipment, in case of the connected equipment, the check marks are not changed but step S25 follows and whether the setting picture plane is finished or not is discriminated.   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0064]   If it is determined in step S27 that the equipment is not the connected equipment, whether the number of equipment connected to the bus is equal to or larger than 6 or not is discriminated (step S28).   Since up to five equipment can be registered, if six or more equipment are not connected to the bus, the check marks are not changed but step S25 follows and whether the setting picture plane is finished or not is discriminated.   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0065]   When it is decided in step S28 that the number of connected equipment is equal to or larger than 6, the check marks are removed (step S29).   Whether the cable has been disconnected or not is discriminated (step S30).   If the cable is disconnected, the equipment is deleted from the list (step S31).   If the cable is not disconnected, step S25 follows and whether the setting picture plane is finished or not is discriminated.   If the setting picture plane is not finished, the processing routine is returned to step S21.

[0066]   By the processes as mentioned above, when the equipment is selected and the "decide" button 73 is pressed, if the check marks have been added so far, the check marks are removed.   If no check mark is added, the check mark is added. At this time, the reserved equipment or connected equipment is controlled so as not to remove the check mark.   The number of

equipment to which the check marks have been added is controlled to become 5.

[0067] When the "return" button 74 is pressed in step S25, the setting picture plane is finished and the screen is returned to the control panel. In this instance, whether the check marks have been added to the five equipment or not is discriminated (step S32). If the check marks have been added to the five equipment, the five equipment with the check marks are registered (step S33). If the check marks are not added to the five equipment, the five equipment checked just before are registered (step S34).

[0068] The ~~broadcasting channel of~~IEEE 1394 channel having the ID No. "63" can be used ~~for preparation~~ for a case where undefined equipment is connected. In the broadcasting channel, the transport packet of MPEG and the PCM audio data can be selected. Now, assuming that the bus output of ~~IEEE1394~~IEEE 1394 at the time of non-connection is an MPEG stream, the MPEG transport stream is transmitted by the broadcasting channel. Now, assuming that the bus output of ~~IEEE1394~~IEEE 1394 at the time of non-connection is a PCM audio stream, the PCM audio data is transmitted by the broadcasting channel.

[0069] Fig. 10 shows a picture plane for initial setting of ~~IEEE1394~~IEEE 1394. As shown in Fig. 10, a selection display 81 to discriminate whether a power source of partner equipment is turned on at the time of connection or not, a selection display 82 to discriminate whether the partner equipment is set to an ~~IEEE1394~~IEEE 1394 input upon connection or not, and a selection display 83 to discriminate whether a bus output of ~~IEEE1394~~IEEE 1394 upon non-connection is set to the MPEG stream or PCM audio data are displayed on the initial setting picture plane. When the MPEG stream side is selected on the selection display 82, the transport stream of MPEG is transmitted in the broadcasting channel. When the PCM audio

16

is selected, the PCM audio data is transmitted in the broadcasting channel.

[0070]   As mentioned above, the MPEG transport stream and the PCM audio data can be selected in the broadcasting channel.   That is, the video data, audio data, and control data compressed by the MPEG system can be transmitted by a packet of the MPEG transport stream.   Even in case of the other data, data which is multiplexed to the transport stream can be transmitted by a packet of the transport stream.   Data such that a compression system differs from the MPEG system as in case of the MD recording and reproducing apparatus can be transmitted as PCM audio data.

[0071]   In the system to which the invention is applied as mentioned above, the number of equipment which are connected to the bus of ~~IEEE1394~~IEEE 1394 is limited to 5.   The names of the five equipment registered are displayed on the equipment selection display 61.   Desired equipment can be selected from the five equipment by the input switching button 67.   The equipment to be registered can be easily changed by the setting picture plane.

[0072]   Although the number of equipment of ~~IEEE1394~~IEEE 1394 which are registered has been set to 5 in the above example, it is not limited to this value.

[0073]   In the above example, when the registration of the equipment is changed, the change of the registration is inhibited in the equipment in which the program reservation has been set or the connected equipment.   However, the invention is not limited to such a construction.   For example, the change of the registration can be also inhibited by generating a warning display such as "The program recording reservation has been set in the equipment to be changed.", "The equipment to be changed has been connected.", or the like.   Such a warning display can be merely performed without inhibiting the registration.

[0074] According to the invention, for example, five equipment are selected from the equipment connected to the interface of ~~IEEE1394~~ IEEE 1394 and the node ID numbers are allocated to the five equipment and registered. By registering them as mentioned above, even if the equipment is disconnected from the interface and connected again, the IRD can recognize the equipment. Further, a number of equipment are not arranged on the list display of the connected equipment and the equipment can be easily selected.

[0075] Among the equipment physically connected to the interface, the five equipment which were connected early are automatically registered. The registration contents can be easily changed by the user input. When the registration contents are changed, the change of registration is inhibited in the equipment in which the program reservation has been set or the connected equipment. Thus, even if the registration is changed, an erroneous operation does not occur.

[0076] The present invention is not limited to the foregoing embodiments but many modifications and variations are possible within the spirit and scope of the appended claims of the invention.

ABSTRACT OF THE DISCLOSURE

In a system in which an IEEE 1394 interface ~~of IEEE1394~~ is provided for an IRD, connected equipment can be easily selected and the operability is improved. Data can be transmitted among the equipment by providing the IEEE 1394 interface ~~of IEEE1394~~ for the IRD. For example, five equipment units are selected from the equipment connected to the IEEE 1394 interface ~~of IEEE1394~~ and node ID numbers are allocated to the five equipment units and registered. Thus, even if the equipment is removed from the interface and connected again, the IRD can recognize the equipment. ~~Further, a number of equipment are not arranged on the list display of the connected equipment and desired equipment can be easily selected. Among the equipment physically connected to the interface, the five equipment which were connected early are automatically registered~~. The registration ~~can be~~may easily be changed by ~~a~~ user input. When the registration is changed, the change of the registration is inhibited among ~~the~~ equipment units in which ~~the~~ a program reservation has been set or the connected equipment. Thus, even if the registration is changed, an erroneous operation does not occur.

484623_1.DOC